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ABSTRACT

Bronfenbrenner's ecological paradigm is well suited for research on school effectiveness. Criteria for identifying effective schools should be thought of as indicators of learning occurring in a context of school practices and other influences. Use of the term "outcomes" implies a linear cause and effect relationship between school practices and student learning. Another limitation of conventional outcome measures is that they are not clearly tied to the ultimate aims of schooling which involve lifelong functioning. Constructive functioning in our culture requires transfer of knowledge to specific situations, weighing conflicting information, and determining the need for and finding additional information. Indicators of effective schooling should combine many measures predicting post school success, including both academic and nonacademic learning. Performance tests and research which establishes empirical validity would help select indicators. Indicators should recognize developmental changes in persons over time and across settings. A hypothetical school setting is described, in which academic knowledge and skills, independent learning, problem solving, and social responsibility are assessed as indicators. (GDC)

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Indicators of School Effectiveness:

Schooling Outcomes in Ecological Perspective

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Indicators of School Effectiveness: Schooling Outcomes in Ecological Perspective

Effective schools can be found in diverse locations, serving a wide range of students. The performance of their students belies the belief, nurtured by fifteen years of disappointing research findings, that schools have little effect on students' learning independent of family background. Research on effective schools promises to yield insights into how schooling practices can be improved to enhance the learning of even highly disadvantaged students (Edmonds, 1979). Such research differs fundamentally from previous studies of school effectiveness by treating individual schools and even classrooms as the units of analysis and by attending to complex interactions within those units rather than relying solely on gross measures of "input" such as years of teacher experience and the availability of audio-visual equipment. (Compare Coleman, et al., 1966, with Rutter, et al., 1979.)

Dissatisfaction with large-scale surveys, standardized tests, and "process-product" studies of school effectiveness has led to a search for new paradigms and new methods. Bronfenbrenner (1979) has developed an ecological paradigm that is particularly well suited to the purpose of understanding school effectiveness. (See also Doyle, 1978, 1979; Tikunoff, 1980.)

One of the challenges entailed in the application of this paradigm is the statement of criteria for identifying effective schools. Such criteria are commonly referred to as outcomes, but this term is suspect because it implies a linear cause and effect relationship between schooling practices and student learning. The fundamental relationship in ecology is mutual interaction rather than one-way causation. Learning, from this perspective, occurs in a context of schooling practices and other influences that interact in complex ways; viewing it as simply a product or outcome of schooling is inadequate. Terms like "outcome" are convenient, even necessary for communication. We need to be able to talk about what happens "as a result of" a particular school experience, but we cannot allow the limitations of language to obscure the fact that schooling and learning are interdependent. They may be treated as process and outcome only in a specified context.

It must be recognized that an outcome in one context may be a process in another. Concretely, what a student learns about numbers at one point becomes either an enabling or a limiting condition in subsequent instructional contexts; it is transformed from an outcome to part of the learning process.

The second limitation to conventional measures of educational outcomes, from an ecological perspective, is that they are not tied clearly enough to the ultimate aims of schooling, which have to do with increasing the learner's capacity to function constructively in a particular culture. Perennial controversy surrounds the issue of what constructive functioning is, how it is fostered, how the culture is defined, and how to balance the needs of the individual with those of the culture, but this broad aim is widely accepted. Unfortunately, attempts to measure school effectiveness must descend into the controversial questions, because statements of aims that are broad enough to win widespread acceptance are too vague and too long-term to be measured directly. We tend, therefore, to measure outcomes that are measurable rather than outcomes that are ultimately most important.

The use of reading scores is a good case in point. Nearly everyone would agree that constructive functioning in our culture requires the ability to read. Scores on reading tests can tell something about comprehension and speed and related factors such as vocabulary. But reading in the world outside school also requires being able to transfer knowledge gained from reading to specific situations, how to weigh conflicting information, and how to recognize when more information is required and how to find it. None of these abilities is adequately assessed by standard tests of reading ability. Moreover, people need to be motivated sufficiently to make use of all these and other related abilities. There is no basis for claiming success for schooling practices that result in high reading tests scores but that might simultaneously destroy students' motivation to read. (See Condry, 1977.)

Proximate measures are required of more specific goals and objectives, but they must predict as accurately as possible the attainment of the ultimate aims of schooling.

The predictive validity of standardized test scores and school grades for success in later life is a point of lively contention. (Compare McClelland, 1973, Bowles and Gintis, 1976, with Jensen, 1980, for example.) Part of this debate is about how much is much. People with different points to make look at approximately the same numbers and say that test scores and grades predict a lot of adult success or not much. No one, however, claims that those measures alone are adequate to separate those who will be successful as adults from those who will not be. Other factors that are not included also play a role. Discovering what some of those factors are, and how to measure them would increase the predictive power of school effectiveness measures.

Indicators of Effective Schooling

A change in language would help to alleviate some of these difficulties. Instead of thinking in terms of "outcomes," we might borrow the term "indicators" from the economists. Economic indicators do not include all of the economic phenomena of interest, but they represent those phenomena. Indicators are taken from specific areas of the economy that are known to correlate closely with broader areas. Therefore, they can signal trends in the larger economy though they are only samples of the whole. Economists do not treat indicators as the end product of a one-way process; they realize that indicators are convenient assessments of a continuous complex interaction. Nor do they act as if indicators are comprehensive. Investors especially need to look beyond the standard indicators for counter-trends, anomalies, and long-term changes in the economy that indicators miss. The change in language from outcome to indicator is not merely linguistic. It entails a change in thinking about what we are measuring and what we can do with those measures.

News broadcasts often refer to the "index of leading economic indicators." Leading indicators are those that show economic trends early. In other words, they predict what will happen to other segments of the economy in a few weeks or months. An index is constructed by aggregating a number of different indicators so that idiosyncracies in

one or two areas are balanced by the overall trend. An index of leading indicators for effective schooling would combine many measures that predicted how students would fare after leaving school. It would include measures of both academic and nonacademic learning. Such an index would recognize, as single "outcome" measures do not, that people get on in the world with different strengths; one will achieve by intelligence what another gains by hard work.

The substitution of the term "indicators" for "outcomes" requires a new set of assumptions about school effectiveness measures. Changing old ways of thinking is very difficult, but developing a useful index of leading indicators for effective schooling is even more difficult. Some suggestions are offered in the following pages about how to approach this challenge.

Indicators might be selected in two ways. One is to develop measures that are related as directly as possible to the ultimate aims they are intended to represent. If writing ability is the aim, then a writing sample will be a more direct indicator than an exercise requiring that a set of sentences be ordered to form a coherent paragraph. If problem-solving ability is the aim, then performance in a realistic exercise might provide the most direct indicator.

The second way to identify indicators is empirically. Correlations can be discovered between measurable performance of students and the demonstration of valued behavior later in life. These may not have the "face validity" of directly related indicators but may be quite accurate nevertheless. Mathematical ability, for example, may indicate a capacity to play chess well even though playing chess does not require numerical manipulation. Once a strong positive relationship had been established empirically, a score on a math test could be used as an indicator of potential chess playing ability.

Leading indicators of school effectiveness ought to be developmental, in the sense that changes in persons persist over time and across settings (Bronfenbrenner, 1979, p. 35). Knowledge, skills, and attitudes that are displayed at one point but deteriorate over time are not developmental and would not be good indicators. Similarly, capacities

that are demonstrated only under very special circumstances, in anticipation of an immediate reward for example, are not developmental and would not serve well. Dewey's (1938) definition of a learning experience as one that opens the learner to future learning experiences is appropriate here too. Indicators ought to remain fairly stable over time, and they ought to be compatible with further learning or growth, not represent a kind of change that leads to stagnation.

McClelland's (1973) eloquent plea for testing of competence rather than intelligence concludes with six suggestions that are desirable characteristics for indicators of school effectiveness as well. (1) "The best testing is criterion sampling." This is consistent with the recommendation above that indicators be as close as possible to ultimate schooling aims. McClelland's illustration is the driving test as a means of assessing driving skill. Any test that requires performance of the ability being taught rather than some small segment of that ability or associated abilities qualifies. (2) "Tests should be designed to reflect changes in what the individual has learned." It makes no sense to adopt measures of human characteristics that resist change as indicators of school effectiveness. Human characteristics that are amenable to schooling are the only useful indications of school effectiveness. (3) "How to improve on the characteristic tested should be made public and explicit." Teachers and learners must be able to work on those abilities that will serve as indicators. If the indicators are valid, improvement on the indicators will reflect real improvement on the ultimate aims as well, not just test sensitivity. (4) "Tests should assess competencies involved in clusters of life outcomes." This is like the suggestion that "indexes" of indicators be used rather than single indicators, but McClelland's point is that the associations should be among real-life tasks rather than among indicators. He suggests communication skills, patience, moderate goal setting, and ego development as illustrations, but notes that more traditional cognitive competencies -- reading, writing, and calculating -- also would be important. His listing of "personality" characteristics emphasizes that many of these are, in fact, competencies that can be taught. (5) "Tests should involve operant as well as respondent behavior." "Operant" means active behavior,

for example, writing an essay as opposed to selecting answers from a multiple choice format. (6) "Tests should sample operant thought patterns to get maximum generalizability to various action outcomes." This is the opposite direction from that taken in the specification of behavioral objectives, where behavior is broken into microscopic bits for teaching and assessment. The difficulty with this approach, as McClelland notes, is that numerous specific accomplishments do not predict very well the broader and more important question of how a person gets the whole job done. Attempting to measure larger patterns of thought avoids this problem but creates another -- the measures are not usually as reliable as would be hoped. McClelland points out this problem and then notes that it is more of a problem for researchers who are concerned about selecting or assessing individuals than for those trying to assess the effect of schools on groups, where the relative unreliability of the measures person-by-person is less of a problem.

When indicators are used to assess an entire school's success rather than to select individuals, the school rather than the individual becomes the unit of analysis. It might be desirable also to use classrooms as units of analysis in order to compare the effectiveness of various teaching styles and arrangements. Moving away from the expectation that indicators must be available for every student opens the possibility of sampling within a school, obtaining some indicators from one group of students and other indicators from different students. Not everyone needs to take the same "tests" if the issue is the progress of a class or a school as a whole.

It would be easier to use indicators of school effectiveness having these properties in small-scale studies than in large-scale comparative studies, which rely on numerical data that can be collected inexpensively. The study by Rutter et al. (1979) cited above used more varied measures of school effectiveness than most previous studies, but only included 12 schools. Darlington, et al. (1980) provide the most interesting example of a large-scale study using unconventional indicators. In evaluating the long-term effects of preschool programs for disadvantaged children, they found, as had earlier evaluators, that effects on participants indicated by grades and test scores dissipated within a few

years. However, they also found that the proportion of children retained in grade or assigned to a special education class was statistically significantly lower among the compensatory preschool participants than among children from control groups. Since being held back a grade or being assigned to a special class can both be considered indicators of failure, this difference serves as an indicator of program effectiveness.

Comparisons across many schools are essential to understanding school effectiveness, but attempts to develop an index of leading indicators for that purpose might best begin with single schools. There are two main advantages to this approach. First, it would allow the active involvement of school personnel, parents, citizens, and older students in the selection of indicators. That involvement would assure that the indicators were considered important by citizens, who are ultimately responsible for assessing a school's effectiveness. Second, a small-scale study can use indicators that are relatively expensive to collect and analyze. Some indicators might be observable in classrooms. Others might be reported by parents, based on their observations of their children at home. Specially arranged situations such as a contest, simulation, or performance might demonstrate student learning in other areas. School records would document still more indicators, such as those employed by Darlington, et al. (1980). These two advantages are related; an interactive approach involving teachers and others in the collection and interpretation of indicators as well as in their selection would put many data collectors in the field. (See Tikunoff, Ward, and Griffin, 1979.)

Valley View: A Hypothetical Illustration

Let us engage briefly in utopian fantasy in order to bring these ideas a little closer to reality -- but only a little closer. Imagine a stable, well-administered high school in a homogeneous middle class suburb. Valley View has a low dropout rate and sends 70% of its graduates to higher education. The teachers are well educated and they work hard. The community is united in its support of the school. A new principal has proposed that the school engage in an intensive self-study as a means of becoming even more

effective than it already is. The school board appoints a task force of staff, students, parents, and citizens to develop indicators of effective schooling in four areas: academic knowledge and skills; independent learning; problem solving; and social responsibility. The school board recognizes that Valley View has other educational goals, but has decided that these four are especially worthy of study.

Before proceeding with this alluring fantasy, we should acknowledge how utopian it is. By using a single school that is already effective, according to most standards, and placing it in a miraculously single-minded community, we have eliminated much of the difficulty of assessing school effectiveness in the real world. But the remaining formidable difficulties, such as agreement on goals, comparisons across schools, and the inclusion of both elementary and secondary levels of schooling, persist regardless of the approach taken to measurement. Setting them aside allows us to focus clearly on the use of indicators.

As indicators of the achievement of academic knowledge and skills, the Valley View task force agrees to use the class means of its students' scores on norm-referenced tests already routinely administered, including the Scholastic Aptitude Tests and the examinations required by their state department of education. These tests will help them compare their school with others and year-to-year comparisons will be one indicator of the success of anticipated improvement efforts. But the task force recognizes that these kinds of tests do not always measure what Valley View is actually teaching and that their purpose is to discriminate among students. They are persuaded by the logic of mastery and competency-based approaches that additional indicators are also required. Therefore, they establish subcommittees in reading, writing, mathematics, science, and social studies to discover or construct criterion-referenced tests that are matched to their own curriculum. Acceptable performance levels are established for each test, and the proportions of students reaching these levels become indicators of the school's effectivenss on its own terms. Teachers and administrators agree that variations in performance will occur among classrooms and that some of that variation is beyond

the teacher's control, but they also recognize that persistent low performances by the same teachers' classes would signal the need to help those teachers.

The familiarity of tests and testing, the existence of a wide variety of ready-made tests of academic knowledge and skills, and the canons of tests and measurements all make the task of finding indicators of learning academic knowledge and skills relatively easy. The task force discovers that finding indicators of independent learning is a greater challenge. They break that area down into three somewhat more manageable topics: demonstrating initiative in cognitive tasks; awareness of the need to learn and ability to meet that need; and seeking learning without adult prompting.

Two approaches are taken to documenting students' initiative in cognitive tasks. One is the use in classrooms of games, puzzles, and exercises engaging high level cognitive functions (e.g., Feuerstein, Rand, Hoffman, and Miller 1980). The teachers who evaluate and record this kind of activity distinguish between the demonstration of cognitive facility and the demonstration of initiative in performing these activities. The second approach requires nonparticipant observation of classrooms. Teachers agree to observe each other's classes and to record instances of cognitive initiative. As they discuss these with each other and with their educational research consultant, they develop clearer definitions and more reliable methods.

Assessing students' knowledge of what they don't know and their ability to find out also calls for a combination of approaches. Teachers decide they need to take more time with individual students to help them diagnose their learning needs in connection with tasks they are just beginning and tasks they have completed unsatisfactorily. Their records of these conferences will be one indicator. Teachers also begin to contrive written exercises that lay out an assignment and then require students to analyze what they already know that will help them complete it and what they will have to learn in addition. Students' performance on such exercises indicates their ability to learn what they need to know. The school librarian also provides data on this ability by documenting student uses of the library to gain knowledge for specific purposes. Parents fill out

checklists reporting instances they know of in which their children sought out needed knowledge or arranged to learn particular skills.

Parents' reports on their own children also contribute to the third aspect of independent learning, seeking learning without adult prompting. Selected parents record their children's activities over a limited period and the knowledge-seeking component of those activities is weighed against the other components, comparing the proportion of television watching devoted to pure entertainment with that providing more learning opportunities, for example. Teachers and volunteers are also trained to observe in classrooms during free choice time, and in the library. There they record instances of students choosing to engage in activities with more educational content. As with the observations of cognitive initiative, refinement of the process increases its reliability as issues such as the relative educational value of reading Time versus Sports Illustrated are confronted and resolved. Observations are also made in nonschool settings such as public libraries, church groups, youth organizations, and student workplaces, and adults in those settings report on students' learning activities that are initiated without adult prompting.

Many different kinds of problem solving are required in adult life, but the Valley View task force decides to concentrate on group problem solving because they believe their school already teaches students how to work on problems by themselves. In order to maximize comparability of different problem-solving groups, they ask a subcommittee to locate or create several kinds of simulations that present realistic problems in a controlled environment. The subcommittee finds that exercises designed for use in human relations training (Pfeiffer and Jones, 1974-1977) and some commercial educational games (Horn, 1980) are a rich source of problem-solving simulations.

One subcommittee member recalls reading about the Robber's Cave experiment (Sherif, et al, 1961) in which a bus was declared to have stalled and a water line was plugged in order to test the group cohesiveness and problem-solving ability of the campers. She proposes that teachers, administrators, and especially sponsors of extracurricular activities contrive problems for groups of students to solve and report on how they perform

when they think the problems are real. Other members have some reservations about the deception involved and about how long it will take students to become suspicious of such situations. They agree, however, that there are probably some genuine problems that arise in classes and extracurricular activities that could be turned over to the students for solution instead of handled by adults and that these, though less predictable and comparable, would also be good tests of group problem-solving skills.

The hardest question the task force has to answer with respect to social responsibility is "What is it?" After some long discussions about such issues as how to know when trying to help someone may be harmful in the long run, the group decides to look for indicators of three aspects of social responsibility: illegal activities, pro-social attitudes, and observed helping behavior. First, they will look at trends in reported instances of vandalism and other forms of delinquency in the community. They recognize that these measures are subject to many sources of variation but hope that if the school begins to teach social responsiblity more effectively, improved student behavior will be reflected in these reports.

Second, they decide to administer some paper-and-pencil measures of social responsibility (e.g., Schwartz, 1968, 1977; Schwartz and Clausen, 1970; Hedin and Conrad, 1979) both because they are simple to use and because they may reflect general attitudes that will influence behavior over a long period of time. However, because they fear that student responses to such measures might not be accurate indicators of their actual behavior, they decide to do some direct observations as well. Some of those observations are already planned in connection with problem solving. They need only add procedures for recording instances of helping behavior in problem-solving situations. The same procedures will also be used by trained observers in other school and community settings. (See Zeldin, Small and Savin-Williams, 1980, for a report on this type of study.)

Additional Considerations

Among the many serious considerations glossed over in the Valley View example is the validation of indicators. The unconventional indicators of school effectiveness

selected by the task force call for the same investment of time, intelligence, professional expertise, and hard work that has gone into developing more familiar measures. In addition, long-term studies following the same individuals are essential to establishing the developmental validity of indicators. In view of the flaws that remain in even the best conventional measures, the need for validation should not be used as an excuse for continuing to ignore critical areas of learning in assessments of school effectiveness. A closely associated issue is the establishment of either norms or criteria for these indicators. Economic indicators are generally reported monthly. Their meaning is established by studies of their patterns over time. For some indicators of effective schooling this approach might work but others cannot practically be administered repeatedly.

Another consideration in studies of effective schools is that learning acquired through family, friends, work experience, and other nonschool experiences cannot be attributed to schooling. (See Bidwell and Kasarda's distinction between education and schooling, 1980.) Efforts to assess school effectiveness must control in some way for students' social class. Advantaged students not only learn outside of school many of the things schools try to teach, but their socialization tends to be functional in the school context, enabling them to learn more of what is offered there. The effectiveness of a particular school should not be judged on the basis of unadjusted indicators, but rather on the basis of the difference between the indicators as measured in that school and the statistically normal indicators for schools serving students of the same social class.

Finally, the notion of an index of indicators may be useful only metaphorically. The advantages of literally aggregating numbers from all the different kinds of indicators that might be used into a single number are probably far outweighed by retaining separate indicators of different kinds of learning. This would make the indicators more readily interpretable and help to identify particular areas of both strength and weakness. Separate indicators would make it possible for those concerned about the effectiveness of a particular school to discuss the possiblity that efforts to increase students' social responsibility, where the indicators are judged unsatisfactory, might depress the indicators of academic

skill, which are satisfactory. Issues of this type are rarely addressed now, in part because the only indicators that are widely used are academic test scores. Taking into account mutual interactions among different goals of schooling is central to an ecological perspective and to understanding school effectiveness.

Conclusion

An ecological perspective should enhance our understanding of effective schools because it takes in, instead of controlling out, much of the complexity that people live with in schools. The notion of schooling "outcomes" is overly simple and should be replaced by the term, "indicators," which allows for multi-directional causality and implies a selective representation of what schools do. "Leading indicators" of effective schooling would be proximate measures of learning that were associated with some of the ultimate aims of schooling. They would be developmental, signalling changes in students that are lasting and that open the way to further learning. Such indicators would meet McClelland's (1973) standards for tests of competence. They could be aggregated -- set side-by-side if not literally added together -- into an "index of leading indicators" for use in single-school improvement efforts or in multi-school comparisons. The employment of indicators in ecological studies of effective schools may help us to understand why students learn more in some schools than in others and what can be done to make all schools more effective.

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